

## A Data Processing System for Implementing an Exchange

THIS INVENTION relates to a data processing system for implementing an exchange between an entity specifying a manufacturing task that is to be completed, and a plurality of manufacturing facilities which may be capable of carrying out the manufacturing task.

### Background

HAHT ([www.haht.com](http://www.haht.com)) categorizes Business-to-business (B2B) exchanges into four different business relationship systems, such as private extranets, private exchanges, public exchanges and consortium-based exchanges.

*Private extranets* provides a data processing system (May not be web-based) for the most trusted supplier/customer partnerships. Such system is developed to improve the efficiency and communication in partners' most strategic B2B processes. Since participation in a private extranet is very small, the partners can invest in specialized technology to optimize the flow of information, transactions, products and services between one another. (One-to-one or One-to-few model: e.g. typical extranets between established companies and their in-house vendors)

*Private exchanges* provides a web-based data processing system, wherein suppliers use this system embedded in their e-commerce website to create a market for their products, providing buying and servicing experience for existing customers, and also to engage new customers. On the other hand, buyers use said system to engage and compare suppliers, and thereby to optimize their buying resources. (One-to-many model: e.g. Internet banking portals, Internet brokerages and regional dealer's e-commerce websites)

*Public exchanges*, that are also called horizontal exchanges, provide a web-based data processing system for commerce for virtually any kind of participant, product or service. Said system allows excess inventory sales, focuses on a particular buying and selling community, focuses on a particular set of products, or simply provides open auction electronic mechanism. (Many-to-many model: e.g. On-line classified, On-line auction and On-line cataloging)

*Consortium-based exchanges* provide a tightly couple web-based data processing system to vertical industries. Such exchanges are motivated by the leading buyers in the market, but usually supported by suppliers, offers ideally a win-win scenario for all concerned. The terms, conditions, transaction definitions, and other elements of commerce in a vertical exchange are turned to reflect the particular practices of the vertical. Most participants benefit from the resulting increase in market efficiency. (Some-to-some model: e.g. automotives portal, petrol-chemical portal, medical portal and healthcare portal.)

Consortium-based exchanges start taking their unique/novel approaches to bringing together buyers and sellers of "custom" and "made to order parts." when companies like Ford, General Motor and General Electric attempt to condense and streamline their laborious supply chain. Additionally, many large companies are using on-line auctions to grind down supplier's prices.

Existing consortium-based B2B exchanges believe that companies like Ford and Firestone will have to focus on quality, responsiveness, and delivery to meet the demands of the future. There's more to consider than just price. Internet auction models may work for basic commodities but they are not a long-term answer for responsible businesses.

These B2B exchanges claim to be a global member network that brings companies together based on their unique manufacturing "processes" rather than simple products, catalogs, and keyword search. With such exchanges, a member company can find pre-qualified business partners globally, with one simple click.

A typical manufacturing B2B exchange has the following web-based data processing system. When a company decides to join the exchange, they log on to the web site and fill out a comprehensive (tedious) questionnaire. The information includes details about the company, their engineering and process capabilities, manufacturing methods, materials used, quality certifications, and even includes links to the member company's web site. This information is next verified by the staffs of the exchange or worldwide affiliated representatives and then documented into a data server. Subsequently, a web-based data processing system creates a community identifier for the particular company similar to a fingerprint or a company's DNA. During a RFQ transaction, said system automatically matches a list of potential sellers of "custom" and "made to order parts" to the buyers.

Generally, the added value of a manufacturing web-based data processing system comes from accurate access to companies that provide tooling, molds, dies, castings, grinding, heat-treating, extrusions & metal forming processes. Such system may help to efficiently establish the buyers' connections or links with manufacturers and vendors of materials, machine tools, equipment, packaging, shipping and import/export financing.

**Problem Statement**

In a general RFQ transaction, buyers rate sellers on: Price, Quality, Delivery and Responsiveness. At the same time, sellers rate buyers on: Payment and Responsiveness. A B2B exchange usually positions herself as a neutral party, who may provide a sophisticated rating system. Theoretically, an ideal B2B exchange should be able to guarantee the buyers the quality of the suppliers while assuring the suppliers a series of businesses from the buyers.

Unfortunately, in practical,

1. A conventional B2B exchange fails to be a neutral party between buyers and suppliers because, in most conventional B2B exchanges, the supplier contributes a major portion of the income in B2B exchange. Therefore, a buyer interest will not 100% been protected, especially if a conflict happens between the buyer and the supplier.
2. The conventional B2B exchange fails to be a neutral party among suppliers because small or medium manufacturers always have lower qualification and/or could not afford to offer price as low as any established suppliers. (From the conventional B2B exchange, a small or medium company can purely gain some RFQ bidding experiences.)
3. Buyers demand for the quality of end products, instead of a compilation of certified suppliers by the exchange's web-based data processing system. For instance, a certified supplier may have supplied a lower grade or expired material due to the inexpensive quote he has committed. Therefore, buyers ultimately bear their own risks of confirming the order. (A zealous company may hit the lowest price, at the last second, by committing to a long-term contract with one simple click.)
4. Conventional web-based data processing system faces difficulties in verifying the suppliers. A main certified supplier might obtain resources from several small suppliers. These small suppliers might come from different countries with different qualifications. In a worst-case scenario, the main supplier might act as a middleman ("loan" their brand names to small suppliers) in a RFQ process. Consequently, buyer in the B2B exchange will obtain a "reasonable" and "mark-up" quote.

### Summary of the Present Invention

To solve the problems described above, a web-based data processing system is proposed. This system is able to upgrade a conventional B2B exchange to a total integrated electronic business for one-stop manufacturing solution.

"Total integrated electronic business" in the context can be described as a business community, which consists of a comprehensive global network of certified suppliers and strategic partners. This global business community invests in a web-based collaborative platform to optimize the flow of information, transactions, products and services between one another. This global business community shall offer all buyers, suppliers and strategic partners synchronized business objective, a standard pricing system, single collaborative platform, an international procurement center, centralized resources (e.g. remote software) and supplier-to-supplier support (e.g. retrofitting supplier provides service to Diecasting solution provider within the B2B exchange).

Likewise, "one-stop manufacturing solution" in this context covers a whole spectrum of manufacturing business and supply chain management, which may be demanded by any B2B customer. This spectrum covers from mechanical/electronic design, production & turnkey services, software & hardware customizations, trading of industrial products, remote software services, resource sharing, maintenance & support, insurance, financing/hire purchase/leasing to end-product delivery. Also, said customer does not limited to solution buyers, end-users, licensees, "pay as you go" member, "flat fee" member, web-based process-lines, systems and machines.

This web-based data processing system provides (1) a moderator desktop and (2) a machine web communication desktop.

The Moderator desktop provides staffs in an exchange a set of tools for planning, quoting, coordination and supervisory on all web-based business transactions for solution buyers, end-users and licensees.

This staff or "moderator" represents customer, in which said customers need not be technical persons who EXACTLY understand process of making products. Also, moderator is the MOST SUITABLE candidate to execute a project or job with respect to customer's targeted budget and tight delivery schedule because he is familiar with competencies of suppliers from Asia-Pacific, Europe and NAFTA hubs and real-time accesses the suppliers' plant capacities. He is the chief project coordinator to acknowledge necessary arrangements of spare part procurement, warehousing, financing, insurance as well as end-product delivery services through a moderator desktop.

Such desktop protects 100% customers' interests in accordance to the responsiveness of RFQ and/or project status, product/solution quality, project cost, and delivery schedule.

Machine web communication desktop is to provide web-based maintenance and support to members, process lines, systems and machines, and web-based resource sharing to "pay as you go" members and "flat fee" members.

Web-based maintenance and support includes:

- emergency support,
- critical service support,
- routine technical support,
- on-line training,
- critical spare parts order,
- software and control upgrades, and
- repair and test services.

Web-based resource sharing includes:

- collaborative platform integrated with web-based Enterprise Resource Planning (ERP) and Supply Chain Management (SCM).
- personnel/experts: Center for Advanced Numerical Engineering and Simulation and International Procurement Center,
- Hardware/Equipment: Research and Testing Center;
- Software: Remote Computer-Aided Design (CAD), Remote Computer-aided Engineering (CAE) and Remote Computer-Aided Manufacturing (CAM).

Said web-based data processing system also distributes Request for Quotations (RFQs) to Moderator in a B2B exchange, which can drastically speed up a RFQ process. Said RFQ distribution method requires at least 3 hubs, such as Asia Pacific, Europe and NAFTA Hubs around the world to respectively entertain RFQs for a period of 8 hours or less than that. (Said three regions have a time difference of 8 hours one another with respect to GMT.)

Lastly, the web-based data processing system is able to directly communicate with a collaborative platform in a B2B exchange. Said collaborative platform may be integrated with existing web-based Enterprise Resource Planning (ERP) and Supply Chain Management (SCM).

#### **Detail Embodiments of the present invention**

Said web-based data processing system is able to upgrade a conventional B2B exchange to a total integrated electronic business for one-stop manufacturing solution.

Targeted one-stop manufacturing solutions covers the following:

- a. Customisation involving the design and production of mechanical/electronic components of first article/prototype, from manufacturing, warehousing and distribution to end customers;
- b. Trading of industrial products which include machinery, equipments and its related tools and accessories;
- c. Retrofitting of machinery and equipment;
- d. Licensing of the design, numerical engineering, manufacturing and simulation softwares;
- e. Value added production services;
- f. Regional center for international procurement activities;
- g. Financing, leasing and hire-purchase of the related production, machinery and equipment;
- h. Insurance on the related production machinery and equipment;
- i. Services in the advanced numerical engineering and simulation activities;
- j. Regional center for research and testing center activities;
- k. Remote software services, which include design, numerical engineering, manufacturing and simulation tool;
- l. Web-based maintenance and support to process lines, systems and machine.

Fig 2 shows the integration of proposed web-based data processing system with customers, suppliers, strategic partners and others.

Components that directly link to said system include management team/account/audit/administrator, customers, group suppliers and strategic partners. Likewise, group-owned suppliers and certified suppliers are indirectly linked to B2B exchange via their respective group suppliers in related sectors. (E.g. group-owned Diecasts supplier and Certified Diecasts supplier report to Diecasts Group Supplier).

All group-owned suppliers (except certified suppliers) belong to a consortium while certified suppliers are the affiliates to said consortium.

This B2B exchange only allows a group supplier from each sector in manufacturing field so that these group suppliers do not have conflicts of interest one another.

Management team, account, audit and administrator are independently linked to the web-based data processing system to monitor and run all business transactions.

A new supplier is invited to be a certified supplier if it can offer solution/product, which cannot be provided by group-owned suppliers. This new supplier is required to undergo an assessment to obtain its certification.

Strategic partners in said B2B exchange consist of a bank, an insurance company and a transportation/ warehousing representative.

1. Bank to provide financing, leasing and hire purchase;
2. Insurance company to compulsorily insure all business transactions;
3. Transportation/warehousing representative to provide freight forwarding, shipping and warehousing services.

Customers in said B2B exchange include solution buyers, end-users, licensees, "pay as you go" member, "flat fee" member, web-based process-lines, systems and machines. The term "Solution buyers" in the context of present invention can be new/existing product initiators (Motorola, Hewlett Packard) or dealers (trading house) for the end-users. Hence, end-users shall not have direct links with the web-based data processing system.

All participants mentioned above, who have direct or indirect links to web-based data processing system, will be provided dedicated desktops for internet-speed communication, collaboration and commerce transaction.

All business transactions of said system are handled on-line with the following conditions:

- (1) Management team/account/audit/administrator, group suppliers, group-owned suppliers and strategic partners are allowed to have on-line and off-line communications with said B2B exchange and customers.
- (2) Certified suppliers are allowed to have on-line and off-line communications with said B2B exchange, but have NO off-line communication with customers. Their on-line communications with customers may only be possible if both parties' identities are encrypted and their communications are fully monitored by said B2B exchange.

The web-based data processing system provides (1) a moderator desktop and (2) a machine web communication desktop. (refer to Fig 3).

Fig 4 illustrates the architecture of web-based data processing system in the present invention assists in business transaction between customers and group suppliers.

Said system offers a comprehensive solution packages to serve all kind of customer needs. Each solution package is directed to its respective group supplier. Solution packages for solution buyer or end-user include

- a. Total manufacturing supply chain from Turnkey Center;
- b. Industrial design & rapid prototyping (RP) and supply chain from Design & RP center;
- c. Quick Tooling & Plastic Injection Moulding (PIM) and supply chain from QuickTooling Center;
- d. Diecasting and supply chain from Diecasts Center;
- e. Special purpose manufacturing and supply chain from Mass Customization Center;
- f. Electronic assemblies and supply chain from Electronic Center;
- g. Purchase of machine from Machine Center;
- h. Machine retrofitting from Retrofit Center;
- i. Purchase of Industrial spare part and machinery component from International Procurement Center;

Solution package of manufacturing software customization and licensing is offered to the licensees. This package is handled by Software Center.

Solution packages of maintenance & support are offered to the web-based systems, process lines and machines.

Solution package of resource sharing for "pay as you go" members and "flat fee" members, include

- 1 Experts: Center for advanced numerical engineering and simulation;
2. Hardware/Equipment: Research and testing center;
3. Software: Remote software services covering design, numerical engineering, manufacturing and simulation tool.

Both maintenance & support and resource sharing packages are managed by Machine-web Communication Desktop.



Fig 5 shows the breakdown structure of Moderator Desktop. Generally, a cluster structure consists of a Project Manager (PM) Desktop, supported by a number of Project Coordinators' (PCs') desktops and Turnkey Specialists' (TSs') desktops. These are the desktops, which allows quick planning, quoting, coordination and supervisory on all business transactions. Such cluster structure can be duplicated/expanded for Asia Pacific Hub, Europe Hub and NAFTA Hub. Also, each hub may have more than one cluster dependent on its Request For Quotation (RFQ) capacity and number of projects.

Project Manager (PM) Desktop:

Project Manager Desktop has the first communication/interaction with a new customer, who approaches said B2B exchange for a RFQ. In the present invention, PM Desktop has a set of tools on business and marketing aspect. Such desktop assists a project manager to understand and analyse customer needs/problems. Next, having inputs from project manager, PM desktop automatically proposes solutions, all manufacturing procedures, arranges with all facilities, bank and insurance company, as well as checks the availabilities of warehouses, freight-forwarding and shipping. Ultimately, with respect to customers' budget constraint, PM desktop shall calculate a total solution/production cost and the best delivery date.

To precisely quote on a RFQ, PM desktop may raise request for sub-quotes for various small project scopes from the group suppliers through their dedicated desktops, or may refer and retrieve previous project records documented in the global database server.

Through Turnkey Specialist desktop or Project Coordinator Desktop, a project manager may activate Turnkey Specialists or Project Coordinators from the nearest region to meet a particular customer on-site if necessary.

Quoted RFQs will be handed/transferred over to Turnkey Specialists/Project Coordinators if said B2B exchange account division receives a purchase order (PO) from the customer.

Project Coordinator (PC) Desktop:

PC Desktop receives projects from PM. Both parties may have an on-line discussion via their dedicated desktops. PC next plans the detail project schedule and budget according to PMs' proposal in his personal planner desktop. PC desktop will be alerted when the customer confirms the payment with the account division.

During the job execution, PC desktop

- Allows project coordinator and other parties, such as PM, customer, auditor, supplier, etc to communicate on-line;

- Provides on-line tracking and control on the delivery schedule and pre-set expenditure, and to document related knowledge into central database;
- On-line provides project status to customer;
- On-line provides PM project status, reviews the status of expenditure and delivery schedule, receives instruction for project activation, and requests for consultation if necessary;
- On-line checks and books all necessary transportations;
- On-line checks and books all necessary warehousing facilities;
- On-line orders material and equipment;

**Turnkey Specialist (TS) Desktop:**

Basically, TS desktop has the similar function as PC desktop. The only difference is that TS desktop allows the execution of all manufacturing processes and procedures, set up of process line, system, etc. while PC desktop is specialized for a particular solution. Usually, a project will be handed-over/ transferred to TS desktop when such project requires resources from more than one group supplier. (refer to Fig 4)

**Project Auditor (PA) Desktop:**

PA desktop allows an audit on PMs' RFQ progress, and TS/ PCs' project statuses.

Fig 6 describes the functions of PC or TS desktop in a collaborative platform. In the collaborative platform, all parties or members of the platform will be given a dedicated desktop. Each desktop is customized with respect to its own authority level. Dedicated Desktops in the present invention are not limited to the following:

Personal planner desktop for PC and TS

Solution buyer desktop/ End-user desktop/ Licensee desktop

Project Manager Desktop

Project Auditor Desktop

Transportation Representative Desktop

Warehousing Representative Desktop

International Procurement Representative Desktop

Group supplier desktop/group-owned supplier desktop/certified supply desktop

Others: administrator desktop, account desktop, etc.

As illustrated in Fig 6, each dedicated desktop is employed for its respective coordination and communication with PC or TS desktop.

Fig 7 shows a breakdown structure of Machine-web Communication Desktop. This desktop is generally divided into resource sharing and maintenance & support.

#### Resource Sharing:

Said B2B exchange offers a compelling real-time/on-line resource sharing service. This is to free companies from investing heavily in IT infrastructure, software & hardware systems and personnel/experts to reap new economy benefits.

Said real-time resource sharing service includes

- A collaborative platform integrated with Enterprise Resource Planning (ERP) and Supply Chain Management (SCM).
- Personnel/experts: Center for Advanced Numerical Engineering and Simulation, International Procurement Center, etc.
- Hardware/Equipment: Research and Testing Center;
- Software: Remote Computer-Aided Design (CAD), Remote Computer-aided Engineering (CAE) and Remote Computer-Aided Manufacturing (CAM)

#### Maintenance & Support:

Said B2B exchange offers its manufacturing community a comprehensive service support, including:

- Emergency support and critical service support: e.g. Emergency Shutdown system, Safety Control system, Fire & Gas systems for chemical application.
- Routine technical support
- Online Training/Seminar
- Critical spare parts
- Software and control upgrades (on-line and off-line)
- Repair and test services

The web-based data processing system in the present invention directly communicate, retrieve and update related information or knowledge with a collaborative platform, integrated with existing web-based Enterprise Resource Planning (ERP) and Supply Chain Management (SCM).

An overview of web-based data processing system architecture is shown in Fig 8.

The web-based data processing system is situated at the "centroid" of the collaborative platform. Integrating existing web-based ERP and SCM technology/engine into the collaborative platform, this system architecture brings in all related members to support and access said system at their respectively authority levels. Each member is given a set of

related tools (inner ring next to the member) to have direct and critical communication, collaboration and commerce transaction with said B2B exchange. Also, these members share a set of common management tools (outer ring next to B2B exchange) within the platform.

Members of this collaborative platform include Customers, Process lines/systems/machines, Strategic Partners, Suppliers and Management team/account/audit.

Generally, such collaboration environment reduces design-cycle time, minimize rework costs, enable innovation and product improvement, and improve procurement efficiency. The present invention combines collaborative commerce solutions with direct commerce opportunities enabling businesses to efficiently and effectively design, market, configure and manufacture products at Internet speeds.

Fig 9 and Fig 10 respectively describe the authorities level of a customer desktop and supplier desktop in the collaborative platform, and the services and resources to which customer and supplier desktops may gain access will be apparent from these Figures.

Fig 11 shows the process flow for distributing RFQs in web-based data processing system.

- (1) First, RFQs from all over the world will be uploaded into a dedicated RFQ server.
- (2) The sending time of each RFQ is converted into GMT.
- (3) These RFQs are then sorted among Asia Pacific, Europe and NAFTA Hubs with respect to the hubs' GMT zone.
- (4) RFQs in each hub may be further distributed among PMs with the respect to the geographical location, project capacity, etc.
- (5) In case of server failure in a particular hub, special instruction/authority will be given by B2B exchange administrator to PMs in other hubs to specifically assist RFQs in the failure hub.

Fig 12 illustrates a process flow for managing RFQs in web-based processing system.

The sequence of steps involved in the processing of RFQ's will be readily appreciated from Figure 12.